



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,302	09/16/2003	Ennis T. Ogawa	TI-33455.1	1776

23494 7590 06/16/2005

TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER

STEVENSON, ANDRE C

ART UNIT PAPER NUMBER

2812

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/662,302

Applicant(s)

OGAWA ET AL.

Examiner

Andre' C. Stevenson

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on March 21, 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


LYNNE A. GURLEY

PRIMARY PATENT EXAMINER

TC 2800, AU 2812

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Detailed Action

Response to Arguments

Applicant's arguments filed March 21, 2005 have been fully considered but they are not persuasive. See below;

JA **Applicant Argues** that the term "active diffusion volume" ^{is} ~~are~~ defined in the specification at page 17, lines 5 to 9, by the simultaneous intersection of the interconnect volume diffusion volume, and stress gradient region at a specific site within a device structure. Hence, active diffusion volume is the smallest overlapping portion of the three volumes surrounding a vulnerable SIV site.

JA **Examiner** has considered the applicants argument but ^{has} ~~have~~ not found it persuasive. The applicant states in the disclosure (pg. #4, line 15-21), that the problem of voids (SIV) exist in devices utilizing back-end technologies. Thus, although Yang does not mention explicitly "Active Diffusion Volume", it is still present in his invention utilizing backend technology. The Examiner takes the position that the claim language, as it is written now, reads on the invention of Yang.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

Art Unit: 2812

subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Yang et al.

(U.S. Pat. No. 6,468,894, Patented 10/22/02, Filed 03/21/01).

Yang shows, in figures 1-12 and corresponding text, in a method where damascene interconnects both electrically active and inactive are formed, with respect to **claim #15**, a semiconductor device structure comprising: a first metallic interconnect (**fig. 7, item 14 & fig 12, item 56**); a second metallic interconnect (**fig. 7, item 28 & fig. 12, item 64**) (**column 3, lines 45-67; column 4, lines 1-5; column 5, lines 18-30**); a primary via structure (**any one of item 30 in fig 7, or any one of item 70 in fig 12**), disposed between and electrically intercoupling the first and second metallic interconnects (**column 5, lines 31-40**); and a buffer structure (**fig. 7, item 32, 34 and 36, or any one of item 30 remaining from the primary via structure, or fig 12, item 68, 72 and 74, or any one of item 70 remaining from the primary via structure**), disposed upon the first metallic interconnect in proximity to the primary via structure, and adapted to buffer the primary via structure from diffusive voiding occurring at a contact point between the primary via structure and the first metallic interconnect (**column 5, lines 31-40; column 4, lines 30-50**). Note that the Examiner considers it inherent, that for example, items 32, 34, 36 and any one of 30, apart from the primary via structure, would buffer the primary structure from diffusive voiding in that the vias 32, 34 and 36 are “capable” of remedying the conventional prior art problem of diffusive voiding by providing alternatives to the primary via structure regarding diffusion issues. *Pertaining to Claim #16*, Yang also shows that the second metallic interconnect and the primary via structure are copper-based dual damascene structures. (**Fig. 8-12 item 62, 64 and 66; column 1, lines 47-52;**

Art Unit: 2812

column 6, lines 22-33). *Pertaining to claim #17*, Yang shows, wherein the buffer structure comprises a second via structure, disposed between and electrically intercoupling the first and second interconnects. **(Fig. 12, item 72, 74 and any one of item 70 remaining from the primary via structure; Fig 7, any one of item 30 remaining from the primary via structure; column 6, lines 22-33). *Pertaining to claim 18***, Yang shows, wherein the buffer structure comprises a second, electrically inactive, via structure **(item 36)**, disposed upon the first metallic interconnect **(item 14)** proximal to the primary via structure **(Fig. 7). *Pertaining to claim #19***, Yang shows, wherein the buffer structure comprises of an electrically inactive structure disposed upon the first metallic interconnect to immediately and completely surround the primary via structure. **(Fig. 7-12, item 32, 34, 36, 68, 72; column 6, lines 22-33; column 5, lines 49-54).** Finally, ***pertaining to claim #20***, Yang shows, wherein the buffer structure comprises: a second via structure, disposed between and electrically intercoupling the first and second metallic interconnects **(any one of item 30 remaining from the primary via structure)**; and a third electrically inactive **(item 36)**, via structure, disposed upon the first metallic interconnect **(item 14)** proximal to the primary via structure **(column 5, lines 32-42 and lines 49-54).**

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

Art Unit: 2812

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure; Dirahoui et al. (U.S. Pat. No. 6,492,259), Chuang (U.S. Pat. No. 6,828,223), Motsiff et al. (U.S. Pat. No. 6,573,538), Hasegawa et al. (U.S. Pat. No. 6,452,274).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andre' Stevenson whose telephone number is (571) 272 1683. The examiner can normally be reached on Monday through Friday from 7:30 am to 4:30 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt, can be reached on (571) 272 1873. The fax phone number for the organization where this application or proceeding is assigned is (703) 308 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956. Also, the proceeding numbers can be used to fax information through the Right Fax system;

(703) 872-9306

Andre' Stevenson

06/10/05


LYNNE A. GURLEY
PRIMARY PATENT EXAMINER
TC 2800, AU 2812